

What is claimed is:

[Claim 1] An apparatus for planarizing a workpiece comprising:

- a) a web having a face, wherein said face is positioned adjacent said workpiece during planarization;
- b) at least one tension assembly configured to maintain tension of said web; and
- c) an orbiting assembly configured to orbit said web relative to said workpiece.

[Claim 2] The apparatus of claim 1 wherein said first face of said web has microreplicated structures with fixed abrasives.

[Claim 3] The apparatus of claim 1 further comprising a drive mechanism for indexing said web a predetermined amount.

[Claim 4] The apparatus of claim 3 wherein said web is indexed intermittently during planarization of said workpiece.

[Claim 5] The apparatus of claim 3 wherein said web is indexed continuously during planarization of said workpiece.

[Claim 6] The apparatus of claim 3 wherein said web is indexed between planarization of a first workpiece and planarization of a second workpiece.

[Claim 7] The apparatus of claim 1 further comprising:

- a new roll cartridge configured for holding an unused portion of said web; and
- a take-up cartridge for receiving a used portion of said web.

[Claim 8] The apparatus of claim 1 wherein said tension assembly may be adjusted to adjust the tension of said web.

[Claim 9] The apparatus of claim 1 further comprising a workpiece carrier configured to carry a workpiece and press said workpiece against said face of said web.

[Claim 10] The apparatus of claim 9 wherein said workpiece carrier rotates said workpiece about a vertical axis.

[Claim 11] The apparatus of claim 9 wherein said workpiece carrier is configured to move said workpiece in an orbital pattern.

[Claim 12] The apparatus of claim 1 further comprising a manifold apparatus configured to effect fluid flow to said face of said web.

[Claim 13] The apparatus of claim 12 wherein said web comprises holes through which fluid from said manifold apparatus may flow.

[Claim 14] A method of planarizing a workpiece comprising:

- loading a first workpiece on one of a plurality of workpiece carriers supported by a rotatable carousel; and
- pressing said first workpiece against a horizontal web and causing relative motion between said first workpiece and said web so as to planarize said first workpiece.

[Claim 15] The method of claim 14 further comprising:

- rotating said carousel to position said first workpiece adjacent a compressible polishing surface; and
- pressing said first workpiece against said compressible polishing surface and causing relative motion between said first workpiece and said compressible polishing surface so as to remove microscratches from said first workpiece.

[Claim 16] The method of claim 15 further comprising:

rotating said carousel to position said first workpiece adjacent a low compressibility polishing surface; and
pressing said first workpiece against said low-compressibility polishing surface and causing relative motion between said first workpiece and said low-compressibility polishing surface so as to further planarize and polish said first workpiece.

[Claim 17] The method of claim 14 further comprising:

indexing said web a predetermined amount after said first workpiece has been planarized to expose new web material in preparation for a next workpiece to be planarized.

[Claim 18] The method of claim 15 further comprising:

loading a second workpiece on a second of said plurality of workpiece carriers during said pressing said first workpiece against said horizontal web.

[Claim 19] The method of claim 18 further comprising:

rotating said carousel to position said second workpiece adjacent said horizontal web; and
pressing said second workpiece against said horizontal web and causing relative motion between said second workpiece and said web so as to planarize said second workpiece during said pressing said first workpiece against said compressible polishing surface.

[Claim 20] The method of claim 16 further comprising:

loading a second workpiece on a second of said plurality of workpiece carriers during said pressing said first workpiece against said horizontal web.

[Claim 21] The method of claim 20 further comprising:

- rotating said carousel to position said second workpiece adjacent said horizontal web; and

- pressing said second workpiece against said horizontal web and causing relative motion between said second workpiece and said web so as to planarize said second workpiece during said pressing of said first workpiece against said low-compressibility polishing surface.

[Claim 22] The method of claim 19 further comprising:

- rotating said carousel to position said second workpiece adjacent said compressible polishing surface; and

- pressing said second workpiece against said compressible polishing surface and causing relative motion between said second workpiece and said compressible polishing surface so as to remove microscratches from said second workpiece.

[Claim 23] The method of claim 21 further comprising:

- rotating said carousel to position said second workpiece adjacent said low-compressibility polishing surface; and

- pressing said second workpiece against said low-compressibility polishing surface and causing relative motion between said second workpiece and said low-compressibility polishing surface so as to further planarize and polish said second workpiece during said step of pressing said first workpiece against said compressible polishing surface.

[Claim 24] The method of claim 23 further comprising:

- rotating said carousel to position said second workpiece adjacent said compressible polishing surface; and

pressing said second workpiece against said compressible polishing surface and causing relative motion between said second workpiece and said compressible polishing surface so as to remove microscratches from said second workpiece.

[Claim 25] The method of claim 24 further comprising:

unloading said first workpiece from said one of said plurality of workpiece carriers during said step of pressing said second workpiece against said compressible polishing surface.

[Claim 26] The method of claim 21 further comprising:

indexing said web a predetermined amount after said first workpiece has been planarized at said web to expose new web material in preparation for said second workpiece to be planarized.

[Claim 27] The method of claim 22 further comprising:

unloading said first workpiece from said one of said plurality of workpiece carriers during said step of pressing said second workpiece against said compressible polishing surface.

[Claim 28] The method of claim 22 further comprising:

indexing said web a predetermined amount after said first workpiece has been planarized at said web to expose new web material in preparation for said second workpiece to be planarized.

[Claim 29] The method of claim 14 further comprising indexing said web intermittently during planarization of said workpiece.

[Claim 30] The method of claim 14 further comprising indexing said web continuously during planarization of said workpiece.

[Claim 31] The method of claim 21 further comprising indexing said web intermittently during planarization of said workpiece.

[Claim 32] The method of claim 21 further comprising indexing said web continuously during planarization of said workpiece.

[Claim 33] The method of claim 25 further comprising indexing said web intermittently during planarization of said workpiece.

[Claim 34] The method of claim 22 further comprising indexing said web continuously during planarization of said workpiece.

[Claim 35] The method of claim 14, wherein said relative motion is selected from the group comprising linear motion, orbital motion, rotary motion, linear and orbital motion, linear and rotary motion, orbital and rotary motion, and linear, orbital and rotary motion.

[Claim 36] An apparatus for planarizing a workpiece comprising:

a) a plurality of polishing stations wherein at least one of said plurality of polishing station comprises a web with a first face which is positioned adjacent said workpiece during planarization; and

b) an orbiting assembly configured to orbit said web relative to said workpiece.

[Claim 37] The apparatus of claim 36 wherein said first face of said web comprises fixed abrasives.

[Claim 38] The apparatus of claim 36 further comprising a drive mechanism for indexing said web a predetermined amount.

[Claim 39] The apparatus of claim 38 wherein said web is indexed intermittently during planarization of said workpiece.

[Claim 40] The apparatus of claim 38 wherein said web is indexed continuously during planarization of said workpiece.

[Claim 41] The apparatus of claim 38 wherein said web is indexed between planarization of a first workpiece and planarization of a second workpiece.

[Claim 42] The apparatus of claim 36 wherein said web has a second face and wherein said apparatus further comprises a supporting surface in contact with said second face.

[Claim 43] The apparatus of claim 42 further comprising:

a new roll cartridge configured for holding an unused portion of said web and allowing said web to be incrementally drawn under tension and moved over the supporting surface; and

a take-up cartridge for receiving a used portion of said web.

[Claim 44] The apparatus of claim 36 further comprising at least one tension device configured to maintain a tension of said web.

[Claim 45] The apparatus of claim 36 further comprising a plurality of workpiece carriers, the number of which corresponds to the number of said polishing stations, wherein each of said plurality of workpiece carriers is configured to carry a workpiece and press said workpiece against said polishing station while causing relative motion between said workpiece and said polishing station.

[Claim 46] The apparatus of claim 36 further comprising a manifold apparatus configured to effect fluid flow to said first face of said web.

[Claim 47] The apparatus of claim 46 wherein said web comprises holes through which fluid from said manifold apparatus may flow.

[Claim 48] The apparatus of claim 44 wherein said tension device may be adjusted to adjust the tension of said web.

[Claim 49] The apparatus of claim 45 wherein said relative motion is selected from the group comprising linear motion, orbital motion, rotary motion, linear and orbital motion, linear and rotary motion, orbital and rotary motion, and linear, orbital and rotary motion.